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CATTLE PRODUCTION INCREASED ON NORTHERN GREAT PLAINS RANGES UNDER CONSERVATIVE STOCKING

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During the first World War, an attempt was made to increase livestock production in the West by grazing increased numbers on the range, but results were disappointing. It now seems doubtful whether heavy stocking resulted in any material increase in pounds of meat marketed after maintenance requirements of foundation herds were met. It is certain that heavy financial losses occurred during the post-war period of readjustment and that lighter stocking and better range management over a period of years has been required to restore the productivity of many ranges that were severely damaged by heavy grazing during the last war.

Once more the problem of the proper balance between range livestock numbers and forage resources of the West has become acute with the rapid increase in the livestock population during the past five years since the last severe drought. Heavy liquidation of livestock and staggering financial losses have been the rule rather than the exception during drought years. Weather records indicate that drought years are inevitable in the western range country. They reoccur at irregular intervals, but on the average of once in 5 to 7 years in the Northern Great Plains. The range forage crop may drop to a small fraction of normal during these drought emergencies. Livestock numbers must be regulated with this possibility in mind. Experience has demonstrated the urgent need for conservative stocking and other desirable range management practices that will minimize the drought hazards and balance numbers of livestock with feed resources that will stabilize production at a sustained high level, but avoid excessive risks and violent fluctuations.

Just what constitutes the proper balance between livestock numbers and range forage, both of which have fluctuated very widely, has been one of the most difficult problems to confront the range livestock producer. There has been wide difference of opinion and practice among producers in meeting this problem. Some believe that fewer and better animals will avoid unnecessary risks and in the end result in sustained production at a higher level. A range experiment to test certain range management practices, conducted by the Forest Service since 1933 at Miles City, Montana, in cooperation with the Montana Agricultural Experiment Station and the U.S. Bureau of Animal Industry, provides data from which the relative merits of three degrees of stocking and grazing by breeding cows may be judged.

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The experimental area comprised about 1,850 acres of typical short-grass range on which a quite uniform stand of blue grama, bluestem wheatgrass, nigger-wool, Sandberg bluegrass, and buffalo grass predominated. Sagebrush, cactus, and various other range plants, typical of short-grass ranges, were associated with the grasses. The experimental area was subdivided into a series of summer and winter pastures for yearlong grazing. Sixty young Hereford cows of uniform age and grade were segregated into three breeding herds of 20 cows each and assigned to the various pastures. Heavily, moderately, and lightly stocked pastures provided an average for the year of 23.1, 30.5, and 38.8 acres, respectively, for cows of the three different herds. Aside from this varying range allowance, the watering, breeding, and care and other conditions were as nearly identical as possible except that the cows with the smaller range allowance required substantially more supplemental hay during most years. The difference was especially marked during drought years.

Effects of Drought and of Varied Grazing on Range Forage

Trends in density of range forage have been recorded annually on representative quadrats within the pastures stocked at varied degrees or intensities. A drastic decline in stand of range vegetation took place in all pastures between 1933 and 1937. By the latter date, the density was down to approximately 10 percent of the predrought level of 1933. This decline was at a very uniform rate on all pastures. A similar decline was recorded on quadrats that were protected from cattle grazing. Precipitation was down to approximately 40 percent of average during 1934 and again in 1936, also in early months of 1937. It was evident that the reduction in density was primarily due to this drought.

Fortunately, the drought was finally broken by good rains during the late summer of 1937 and the stand of vegetation began to increase again. This increase was also about the same in all pastures. It is worthy of note, however, that after four years of relatively favorable precipitation that the total stand of vegetation in early 1941 was only about two-thirds as thick as before two severe drought years of 1934 and 1936. Greater average height growth of the thinner vegetation during these recent favorable years has compensated somewhat for reduced density in all pastures. Except for this, the effects of drought would have been even more prolonged and severe on range livestock production.

Minor differences in relative height growth were recorded in 1941 for some grasses grazed at different intensities in the various pastures. For instance, the basal leaves of blue grama and the seedstalks of little bluegrass were significantly higher on lightly than on heavily stocked pastures within one subtype. This indicates that the forage crop on some heavily stocked areas is slowly deteriorating and falling behind in vigor. Similar differences were not found on all types or species in early 1941. However, there is always danger that once range deterioration has been started by grazing too heavily, that it may proceed at an accelerated rate with such use. The cumulative effects of varied rates of stocking will be recorded as this experiment continues. A conservative rate of stocking has resulted in substantially greater beef production per cow from the beginning.

Feed Costs and Calf Production as Affected by Degree of Stocking

Not only have weaning weights of calves averaged lower, but total feed costs have been higher for heavily stocked as compared to moderately and lightly stocked experimental range pastures, as is evident from tables 1 and 2.

Table 1.--Weaning calf production and values, 8 years, 20 cows in each lot.

Degree of Stocking	CALVES WEANED					
			Calf Weight - Pounds			
	Total number	Percent crop	Total eight years	Average per calf	Average calf weight per cow	Average yearly value per cow 1/
Lot 1 - Heavy (23.1 A. per cow, yearlong)	124	77.5	39,873	321.6	249	$19.92
Lot 2 - Moderate (30.5 A. per cow, yearlong)	135	84.4	48,342	458.1	302	24.16
Lot 3 - Light (38.8 A. per cow, yearlong)	131	81.9	47,035	359.1	294	23.52

1/ Value based on 8 cents per pound for all calves.

Table 2.--Feed costs, 8 years, totals and averages.

Degree of stocking	Kind and Total Cost of All Feed			
	Hay and supplement 1/	Range forage 2/	Total	Per cow
Lot 1, Heavy	$1155.17	$369.60	$1524.77	$9.53
Lot 2, Moderate	796.83	488.00	1284.83	8.03
Lot 3, Light	746.66	620.80	1367.46	8.55

1/ Based on hay at $8.00 per ton.
2/ Range forage rental 10 cents per acre yearly.

The breeding practice has been the same for all pastures. Bulls were with the cows for a period of 6 to 7 weeks in late June and through July. Calving extended over a similar period beginning late in March. Ordinarily, calves were weaned during the last half of October at an average age of approximately 6½ months. However, during the 1934 and 1936 drought years, it was necessary to wean calves when only 4 to 5 months old. For these two years, the drought-stricken calves averaged only 192, 245, and 249 pounds, respectively, for heavily, moderately, and lightly stocked range pastures. If these light weight calves produced under drought conditions were

excluded, average calf weights for the remaining six years would be greater by 32 to 45 pounds than in the above tabulation. During the three favorable years, 1939 to 1941 inclusive, the weaning calves have averaged 395, 444, and 436 pounds, respectively, when approximately 6½ months old. The above data include only eight years because dry 2-year-old heifers were used in 1937 and no calves were produced that year.

It will be noted from the above tabulations that all cows on the heavily stocked range produced an average of 249 pounds of weaning calf weight. The average was 53 and 45 pounds heavier for cows grazed at moderate and light intensities. These differences are highly significant and are due partly to better calf crop but mainly to the heavier calves that had a more liberal allowance of range forage on the larger pastures. If calves of all lots are valued at 8 cents per pound, regardless of weight or condition, those from moderately and lightly stocked ranges were worth an average of $4.24 and $3.60 per cow more than from the heavily stocked range.

Total yearly feed costs averaged $9.53 per cow on heavily stocked range, which was higher by $1.50 and $0.98 per cow than for moderately and lightly stocked pastures. When these differences are added to the greater value of the heavier calves, the total advantage is raised to $5.74 and $4.58 per cow in favor of more conservative range use.

The foregoing comparisons do not fully measure the penalties or disadvantages of heavy stocking. Certain other items must be included to show the comparative merits and complete the picture. In the first place, the prevailing price for hay during drought years rose to $20 per ton or more instead of $8 as charged in the tabulation. If this higher cost were used for the increased hay required on heavily stocked range during drought years, the difference in cost would be even greater than the $1.50 and $0.98 indicated above.

Heavy grazing also resulted in some reduction in market quality of calves that were uniformly well bred and otherwise of high quality. All calves were the product of registered bulls and high quality cows most of which were eligible to be registered. Nevertheless, the calves from heavily stocked pastures were relatively rough and lacking in "bloom" or quality for best market prices. Ordinarily, they were not sold at weaning time, but it is conservatively estimated that they would have sold at a quarter to a half a cent per pound less than the average for the other two lots, instead of at the same figure as shown by the above tabulation. In recent years a splendid job of herd improvement by culling inferior females and use of purebred bulls has been accomplished by many range producers. Heavy stocking tends to nullify the benefits of such systematic herd improvement. A skimpy allowance of range forage prevents development of full potential quality of high grade range animals. The growing demand for better quality helps to justify a conservative degree of grazing that is essential to realize the full benefits of good breeding practices.

Relative weight or salvage value of cows that are to be culled is still another item that deserves consideration in deciding on how heavily to stock the range

Cows from the heavily stocked experimental pastures were usually 50 pounds or more lighter at the fall shipping time when 10 to 15 percent of a breeding herd is normally culled and marketed. A fair appraisal of these additional items, including reduced salvage value of cull cows, reduced market quality of calves, and greater feed costs during drought years resulting from heavy stocking, indicates that the margin of $4.58 to $5.74 per cow actually recorded in the above comparison should be increased by $1.00 or more. Heavy grazing thus results in a substantial handicap to profitable range cattle production.

All of the foregoing items together do not fully measure the increased risks involved by heavy stocking that leaves no adequate margin of forage for emergencies. Forced liquidation of foundation breeding herds during frequent severe drought years has resulted in financial disaster to thousands of range livestock producers. A conservative degree of grazing is one effective means of mitigating such disasters that have occurred periodically due to drought, grasshoppers, or other cause of a forage shortage.

Favorable results were noted from certain other range management practices used in this experiment that deserve brief mention. A central water supply was so arranged that calves, as well as cows, could drink at any time. Even young calves drank regularly during hot weather. A tank heater was used in winter. Salt, mixed with bonemeal, was kept before the cattle at all times but was located at a distance from the water to encourage uniform utilization of forage on all parts of the range pastures. Also, the summer pastures were grazed from about mid-May to mid-November, and the winter pastures during the remaining six months. This gave the vegetation the advantage of a yearly rest period and facilitated seed production to help maintain the range. This also provided fresh forage for cows at critical periods - in the spring immediately after calving and again in the fall after calves were weaned but before severe winter weather.

The limited breeding period resulted in calves of nearly equal age, born from late March to about May 20, that were branded, vaccinated, and weaned with a minimum of expense and disturbance on the range. Early spring calves of uniform size are an advantage at market time. On the other hand, late summer and fall calves fail to develop rapidly on dry forage, particularly during a drought year. If not old enough to wean in the fall, they are a drain on the vitality of cows during the winter that often results in extra feed cost. The advantages of early calves are so numerous that they tend to overbalance any slight advantage of a small increase in calf crop that might result from a longer breeding season.

The seasonal peak of weight for cows with calves was usually reached relatively early in the summer and declined slowly thereafter as feed became dry and less nourishing. Dry cows ordinarily reach peak weights a little later during normal years. During two drought years, however, peak weights were recorded for wet cows in May or June and for dry cows in June or July, depending on the scarcity of forage.

A low rate of gain or actual weight losses during late summer months, together with the fact that livestock prices average lower after midsummer, points clearly to the desirability of selling cows to be culled for any reason early in the season rather than in late fall. During a drought year, it is often of the utmost importance to make early sales. The earlier this can be done, the more range forage will be left for the breeding herd. Early sales thus become a particularly desirable

range management practice during drought years because of greater market returns, less risks, and a saving in feed costs that may be particularly high at such a time.

Results of this experiment on short-grass ranges have a direct bearing on the major problem of what is proper balance between livestock numbers and feed resources on western ranges. This problem is particularly acute with present numbers at or near any previous maximum. No one can foretell when the next drought will occur. War needs now call for increased marketing rather than increased numbers. Increased marketing goals set for 1942 also offer a remarkable opportunity for adjustments to correct a precarious if not a dangerous relationship between rapidly increasing numbers without adequate feed reserves. Increased marketing at present high prices thus provides a particularly favorable opportunity for restoring a safer balance between livestock numbers and forage supplies. In the

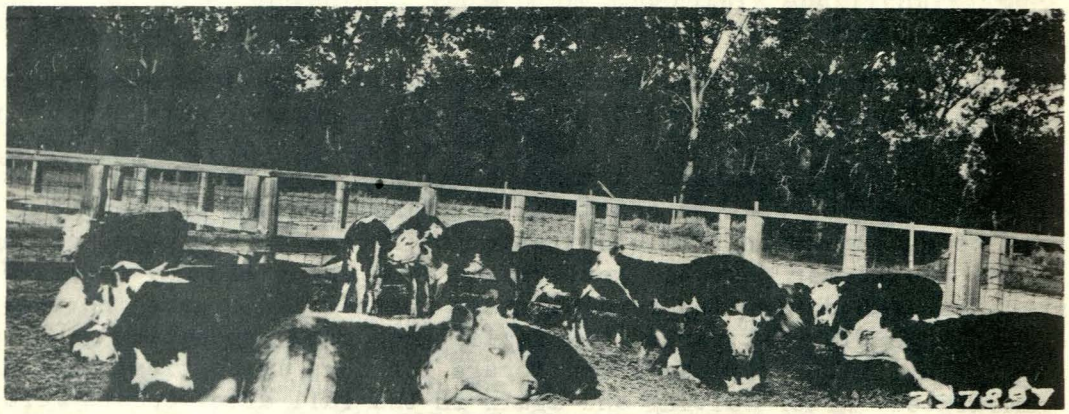

Photo No. 297897 - Forced shipment in early July of well bred calves at $4 to $8 per head from heavily grazed Montana ranges during the 1934 drought.

past, heavy liquidation on glutted markets at very low prices has been the rule when numbers reached the maximum. Overgrazed range is one major reason for violent fluctuations in prices and in livestock numbers.

Heavy stocking of these experimental ranges during an 8-year period reduced the calf crop and increased feed costs by an average of from $4.56 to $5.74 per breeding cow as compared to more conservatively grazed ranges. These differences would be at least $1.00 per cow greater if suitable allowance was added for reduced salvage value of breeding cows and reduced quality and market value of under nourished calves.

In actual range livestock operations, the increased risks involved by heavy stocking may transcend all the actual differences recorded in this experiment. During the inevitable drought years, supplemental feed costs frequently reach exorbitant prices, heavy death losses occur, and the final result of heavy stocking has too often been forced sale of foundation breeding herds on glutted markets at ruinous prices. The risks, incidental to the drought hazard, have been one of the greatest handicaps to stable conditions within the range livestock industry.

Furthermore, heavy stocking often means that an unduly high proportion of the available feed is used up in maintaining the breeding herd, leaving very little for a net increase in weight for marketing. Conservative stocking of the ranges is, on the other hand, a foundation stone for sustained high production of range livestock products. This, together with good range management practices, is needed to insure the maximum sustained livestock production and a greater measure of stability for homes and people dependent on western ranges. Conservative stocking is also a first step in avoiding violent fluctuation of livestock numbers and prices that have been so disastrous to producers but so characteristic of the range livestock industry. Under present conditions, it seems evident that increased livestock sales, rather than increased stocking of western ranges, will contribute best to war needs and to greater stability during the readjustment period afterwards.

land
livestock
other

per
55.50
45.00
5.00
105.00

55.00
50.00
30.00
90.00

######

Intensity Grazing	Acres	Income per Cow (Calves)	Cost Feed per Cow Hay + Range	Net Income per Cow	Net Income per Acre
Light	38.8	23.52	8.55	14.97	.382
Moderate	30.5	24.16	8.03	16.13	.529 *
Heavy	23.1	19.92	9.53	10.39	.449

78.6%
59.5%

Net income per acre is 8¢ greater on moderately grazed range as compared to heavy grazing, an increase of 17.8 per cent in per acre income x

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Land value/A depends on Net income/A and length of time such income can be maintained, thus differential in favor of light o moderate stocking over heavy is greater than net income indicat

Assuming the following investment,

	Heavy	moderate	Light
Land	55.00	55.00	55.00
Livestock	45.00	35.37	26.79
Other	5.00	5.00	5.00
Total	$105.00	95.37	86.79
Income	10.39	12.67	8.91
		(16.13)	(14.97)
Interest on Invest.	9.89	13.28	10.27
		+ 3.39	.38